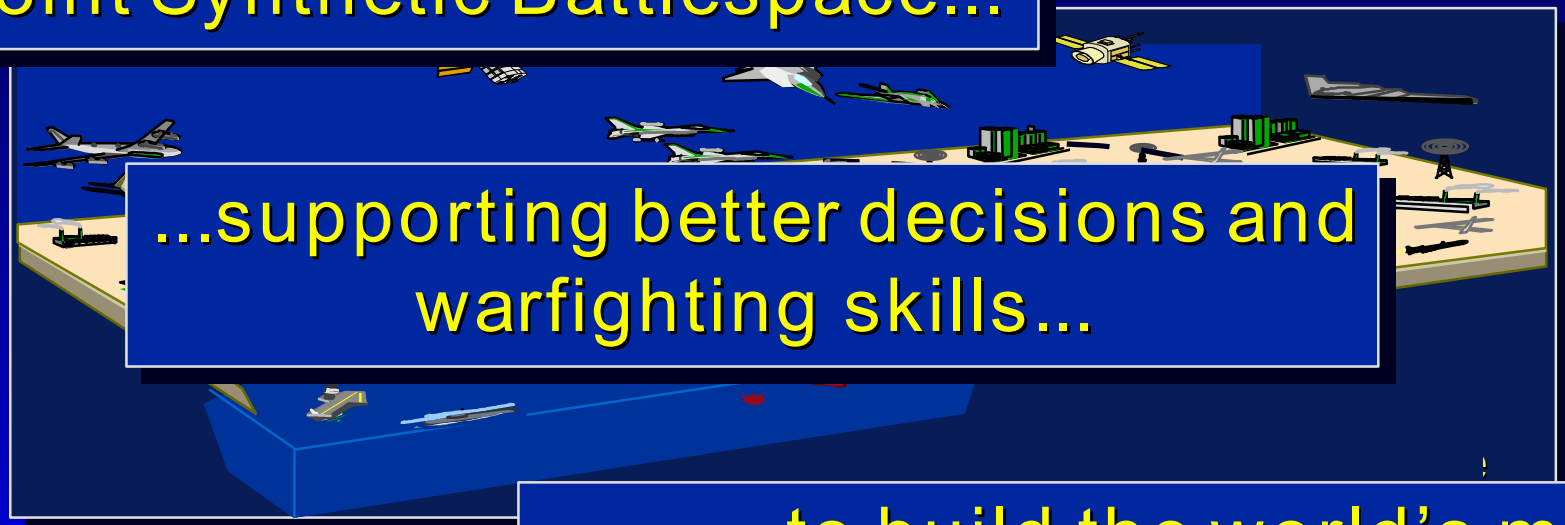
AF M&S VISION

A Joint Synthetic Battlespace...



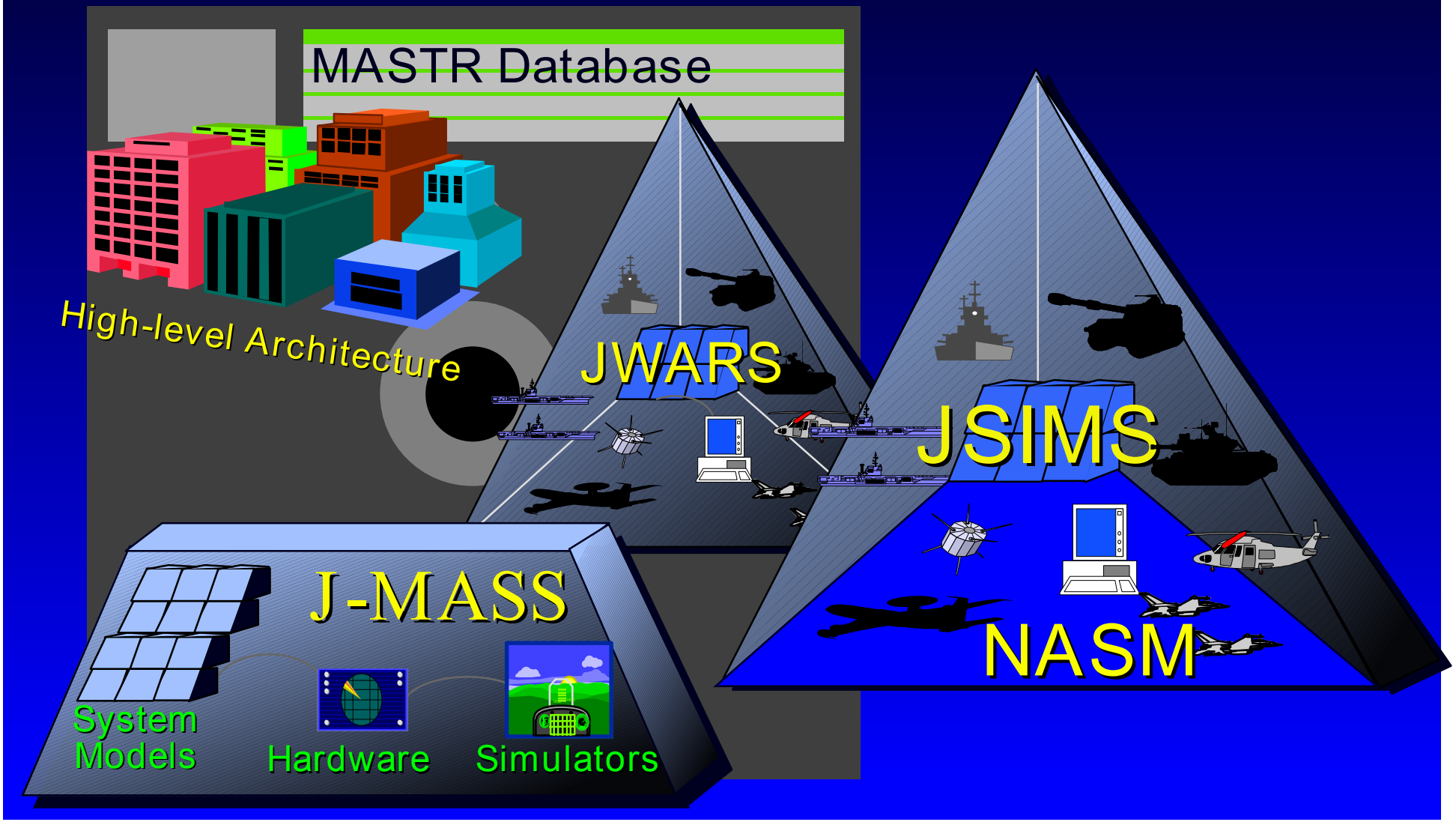
...supporting better decisions and warfighting skills...

... to build the world's most respected air and space forces for the Joint Force Commander

DMSO FOCUS: COMMON DoD-WIDE SIMULATION FRAMEWORK

- Simulation High-level Architecture (HLA)
- "City Architecture" approach - permits, codes, & standards
- AF must participate in HLA development

JOINT STANDARDS

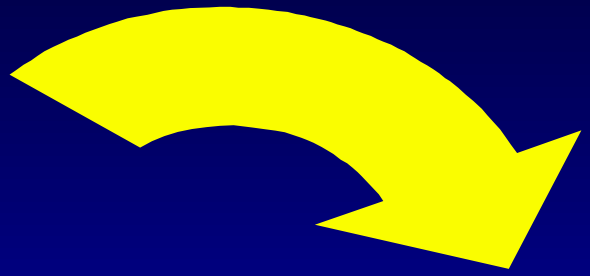


NEAR- TERM M&S STRATEGY

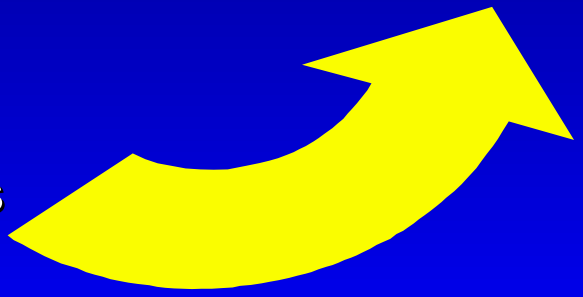
- Participation and Training
  - Prime Warrior Seminar
- Air and Space Power Representation
  - Air and Space Power Validation Group
- Analytical Methodology
  - AF POM Analysis Wargame

ANALYSIS, M&S STRATEGY

- LONG TERM EFFORTS
  - JSIMS/NASM
  - JWARS
  - Verification, Validation, and Accreditation (VV&A)
- NEAR TERM EFFORTS
  - Air and Space Power Validation Group
  - PRIME WARRIOR Seminar
  - AF POM/JWCA Analysis Wargame



- AIR& SPACE POWER STORY
  - AF Contributions to Campaigns



THE PROBLEM ADDRESSED BY ASPVG

- Decisions could be made based on output from models which don't fully or accurately portray the capabilities of air and space power

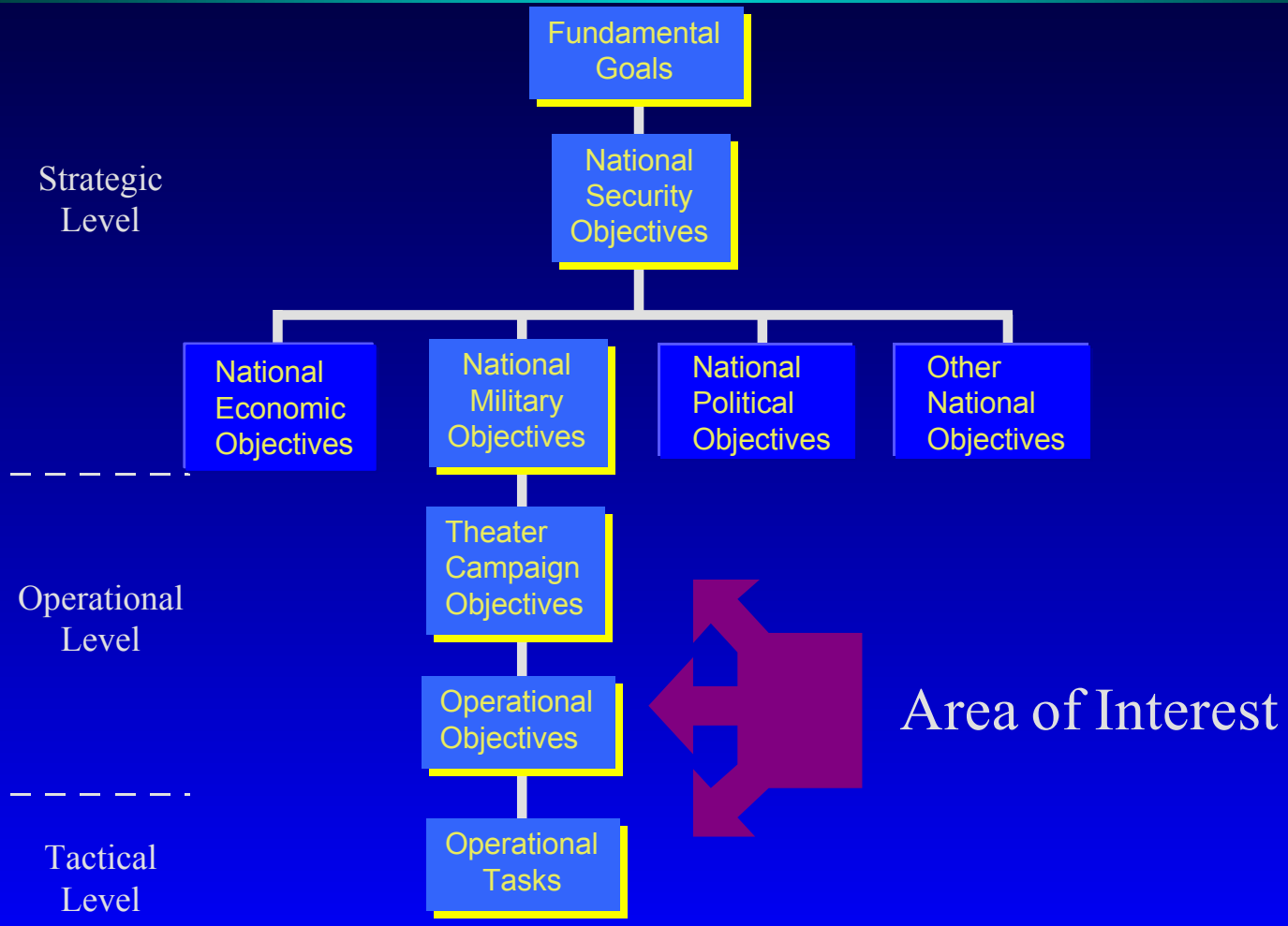
PURPOSE

- PURPOSE OF ASPVG: To evaluate the representation of air and space power in major campaign combat models used in the joint arena
  - Provide the results to leadership, model users, model developers, and AF wargame participants
- PURPOSE OF BRIEFING JOINT & CINC STAFFS
  - To explain ASPVG methodology
  - To provide findings on TACWAR, THUNDER, and ITEM (models used in the joint arena)

MEMBERS

- HQ
  - AF/PEY
  - AF/XOM
  - AF/INX
  - AF/LGX
  - AF/TEP
  - AF/XOF
  - AF/XOO
  - AF/XOR
  - AF/XOX
  - SAF/AQX
- MAJCOM Reps
  - ACC/XP-SAS
  - AETC/XOR
  - AFSOC/XPP
  - AMC/XPY
  - ASC/XRE
  - ESC/XRP
  - OAS/DR
  - SWC/AES
- FOAs/DRUs
  - AFC4A
  - AFSAA
  - AFWI
  - WPC

STRATEGIES-TO-TASKS APPROACH



MRC CAMPAIGN OBJECTIVES

- Halt invading armies
- Marshal and sustain in-theater assets
- Evict halted armies from friendly territory
- Gain, maintain air superiority
- Gain, maintain sea control
- Gain, maintain space control
- Gain, maintain information dominance
- Deny possession/use of weapons of mass destruction
- Suppress national capacity to wage war

METHODOLOGY
Operationally-Oriented Evaluation Model Evaluation

MRC Model

CAMPAIGN OBJECTIVES	OPERATIONAL OBJECTIVES	THESE OPERATIONAL TASKS?
• Halt Army	Delay Adv units Delay Reinforcements Friendly fire spt	Mine roads and railbeds Destroy/damage convoys Disrupt field logistics sites Drop bridges
• Marshal	Airlift Air refuel Recover Maintain Secure bases	Airlift forces into distant theater Airlift forces within theater Airdrop troops, supplies
• Evict Army	Overrun Reinforcing Enemy fire spt	
• Air Sup.	Air attacks Sortie gen SA defenses	Destroy/damage acft in flight Destroy/disrupt CMs in flight Disrupt sensors on enemy acft
• Sea Cntrl		
• Space Cntrl		
• Info Dom.		
• Deny WMD	Nat'l POL Nat'l transp Nat'l electric Nat'l comm War-spt ind Political Troop motiv	Disrupt/destroy refineries Disrupt/destroy storage facilities Sever key pipelines Disrupt off-load sites Disrupt/destroy control facilities
• Suppress Capacity		

Does it play. . .

EVALUATION CHECKLIST

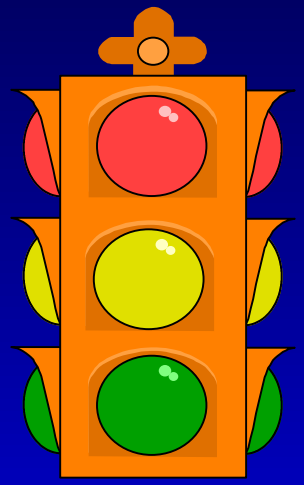
I. CAMPAIGN OBJECTIVES A. Operational Objectives 1. Operational Tasks	CAN MODEL PLAY?	HOW MODEL PLAYS TASK	USE OF RESOURCES (4, 2, 0)	IMPACT OF TASK	IMPACT DEPICTION (4, 2, 0)	IMPACT USUALLY PLAYED?
I. HALT INVADING ARMIES						
A. Delay/destroy/disrupt lead elements of armored advance						
1. Destroy/damage advancing armored vehicles						
2. Destroy/damage accompanying support vehicles						
3. Mine/cut key attack routes						
B. Delay/damage reinforcing forces and supplies in the rear						
1. Mine/cut roads and railbeds						
2. Destroy/damage armored and other vehicles in convoys or on trains.						
3. Disrupt field logistics sites, transportation nodes, assembly areas						
4. Drop bridges, block tunnels and other choke points						

EVALUATION SYSTEM FOR TASKS

RATING	USE OF RESOURCES	RATING	IMPACT OF TASK ACCOMPLISHMENT
4	Explicit use of resources	4	Explicit and automatic representation of impact
2	The user must modify another resource not normally used for this task OR, resources can be set aside, but cannot actually be used and suffer attrition	2	User must manually input impact
0	Resources cannot be used explicitly or set aside	0	Impact is not represented.

INDICATORS FOR OBJECTIVES

- USE OF RESOURCES
  - Green: all tasks rated “4”
  - Yellow: at least one task rated “2”
  - Red: at least one task rated “0”



- IMPACT OF TASK
  - Green: all tasks rated “4”
  - Yellow: at least one task rated “2”
  - Red: at least one task rated “0

- IMPACT USUALLY PLAYED?
  - Green: all tasks “Yes”
  - Red: at least one task “No”

RATING SYSTEM - EXAMPLE 1

I. CAMPAIGN OBJECTIVES A. Operational Objectives 1. Operational Tasks	CAN MODEL PLAY?	HOW MODEL PLAYS TASK (LOOK UP TABLES, USER INPUT, INPUT FROM OTHER MODELS)	USE OF RESOURCES (4, 2, 0)
2. Refueling aircraft moving to attack enemy forces	Y	Tankers are not explicitly modeled	0

IMPACT OF TASK ACCOMPLISHMENT (SEE CRITERIA FOR EVALUATION)	IMPACT DEPICTION (4, 2, 0)	IMPACT USUALLY PLAYED?
The user must model the effects of refueling through his input for each aircraft's range and endurance. However, tanker attrition and refueling problems are not played.	2	N

RATING SYSTEM - EXAMPLE 2

I. CAMPAIGN OBJECTIVES A. Operational Objectives 1. Operational Tasks	CAN MODEL PLAY?	HOW MODEL PLAYS TASK (LOOK UP TABLES, USER INPUT, INPUT FROM OTHER MODELS)	USE OF RESOURCES (4, 2, 0)
1. Destroy/damage command bunkers	Y	Assets could be assigned to this task	4

IMPACT OF TASK ACCOMPLISHMENT (SEE CRITERIA FOR EVALUATION)	IMPACT DEPICTION (4, 2, 0)	IMPACT USUALLY PLAYED?
Accomplishing this task would have no impact on the enemy's capability	0	N

RATING SYSTEM - EXAMPLE 3

I. CAMPAIGN OBJECTIVES A. Operational Objectives 1. Operational Tasks	CAN MODEL PLAY?	HOW MODEL PLAYS TASK (LOOK UP TABLES, USER INPUT, INPUT FROM OTHER MODELS)	USE OF RESOURCES (4, 2, 0)
1. Mine ports, choke points, and anchorages	Y	Assets could be assigned to this task	4

IMPACT OF TASK ACCOMPLISHMENT (SEE CRITERIA FOR EVALUATION)	IMPACT DEPICTION (4, 2, 0)	IMPACT USUALLY PLAYED?
The effects are scripted by the user's input for initial supply levels in-theater	2	Y

TACWAR 4.0

- Used in force structure assessments and OPLAN development
  - Used in NIMBLE DANCER
  - Used in GLOBAL
- Developed for Army
- Measures of Outcome: FLOT, attrition, # targets destroyed
- Highly aggregated, fast running
- Off-line analysis done for force deployment into theater
- Many assets not represented in model play: tankers, C4I, space, airlift (with logistics module off)

TACWAR - SUMMARY

I. CAMPAIGN OBJECTIVES	# TASKS	USE OF ASSETS	IMPACT DEPICTION	IMPACT USUALLY PLAYED?
I. HALT INVADING ARMIES	10		4 6 0	7 3
II. MARSHAL AND SUSTAIN IN-THEATER ASSETS	13	1 2 10	1 6 6	3 10
III. EVICT HALTED ARMIES FROM FRIENDLY TERRITORY	11		3 8 0	9 2
IV. GAIN, MAINTAIN AIR SUPERIORITY	18	15 0 3	12 2 4	13 5
V. GAIN, MAINTAIN SEA CONTROL	3	2 0 1	0 2 1	1 2
VI. GAIN, MAINTAIN SPACE CONTROL	8	3 0 5	0 0 8	0 8
VII. GAIN, MAINTAIN INFORMATION DOMINANCE	12	5 0 7	0 5 7	1 11
VIII. DENY POSSESSION AND USE OF WEAPONS OF MASS DESTRUCTION	17	14 0 3	10 1 6	11 6
IX. SUPPRESS NATIONAL CAPACITY TO WAGE WAR	25	21 0 4	0 1 24	0 25

THUNDER 6.3

- Used & developed by AF for analyses ranging from individual weapon systems to force structure composition
- Measures of Outcome: FLOT, attrition, number of targets destroyed
- Off-line analysis done for force deployment into theater
- Assets not represented in model play: space, airlift

THUNDER - SUMMARY

I. CAMPAIGN OBJECTIVES	# TASKS	USE OF ASSETS	IMPACT DEPICTION	IMPACT USUALLY PLAYED?
I. HALT INVADING ARMIES	10		7 3 0	
II. MARSHAL AND SUSTAIN IN-THEATER ASSETS	13	3 3 7	3 8 2	7 6
III. EVICT HALTED ARMIES FROM FRIENDLY TERRITORY	11		7 4 0	10 1
IV. GAIN, MAINTAIN AIR SUPERIORITY	18	17 0 1	16 2 0	17 1
V. GAIN, MAINTAIN SEA CONTROL	3		1 2 0	
VI. GAIN, MAINTAIN SPACE CONTROL	8	3 0 5	0 0 8	0 8
VII. GAIN, MAINTAIN INFORMATION DOMINANCE	12	6 1 5	4 7 1	7 5
VIII. DENY POSSESSION AND USE OF WEAPONS OF MASS DESTRUCTION	17	16 0 1	13 4 0	15 2
IX. SUPPRESS NATIONAL CAPACITY TO WAGE WAR	25	21 0 4	0 1 24	1 24

ITEM 6.0

- Used in joint arena for force structure and strategy assessments
- Developed for Navy
- Measures of Outcome: geographic location of forces, attrition, no. of targets destroyed
- Highly aggregated, fast running
- Results of force-on-force engagements not accepted by Army
- Off-line analysis done for force deployment into theater
- Assets not represented in model play: tankers, C4I, space, airlift

ITEM - SUMMARY

I. CAMPAIGN OBJECTIVES	# TASKS	USE OF ASSETS	IMPACT DEPICTION	IMPACT USUALLY PLAYED?
I. HALT INVADING ARMIES	10		1 9 0	5 5
II. MARSHAL AND SUSTAIN IN-THEATER ASSETS	13	0 0 13	0 9 4	1 12
III. EVICT HALTED ARMIES FROM FRIENDLY TERRITORY	11		2 9 0	6 5
IV. GAIN, MAINTAIN AIR SUPERIORITY	18	15 0 3	10 5 3	10 8
V. GAIN, MAINTAIN SEA CONTROL	3		0 2 1	2 1
VI. GAIN, MAINTAIN SPACE CONTROL	8	2 0 6	0 0 8	0 8
VII. GAIN, MAINTAIN INFORMATION DOMINANCE	12	6 0 6	0 7 5	0 12
VIII. DENY POSSESSION AND USE OF WEAPONS OF MASS DESTRUCTION	17	14 0 3	8 5 4	8 9
IX. SUPPRESS NATIONAL CAPACITY TO WAGE WAR	25	21 0 4	0 0 25	0 25

MODEL COMPARISON

I. CAMPAIGN OBJECTIVES	TACWAR			THUNDER			ITEM		
	ASSET USE	IMPACT	PLAYED	ASSET USE	IMPACT	PLAYED	ASSET USE	IMPACT	PLAYED
I. HALT INVADING ARMIES									
II. MARSHAL AND SUSTAIN IN-THEATER ASSETS									
III. EVICT HALTED ARMIES									
IV. AIR SUPERIORITY									
V. SEA CONTROL									
VI. SPACE CONTROL									
VII. INFO DOMINANCE									
VIII WMD DENIAL									
IX. SUPPRESS NATIONAL CAPACITY TO WAGE WAR									

SUMMARY AND LESSONS LEARNED

- If FLOT movement is the only campaign measure of outcome emphasized, the impact of air and space power won't be fully portrayed.
- Desert Shield/Desert Storm provides example
  - First forty days of campaign saw no FLOT movement whatsoever
  - Critical campaign objectives were achieved by airpower before ground war, e.g.,
    - Marshal and sustain in-theater assets
    - Gain, maintain air superiority
    - Gain, maintain information dominance
    - Suppress national capacity to wage war

SUMMARY AND LESSONS LEARNED

- Much of what air and space power provides is assumed or not played.
  - Most models assumed deployment occurred as per TPFDD
  - Strategic attack sorties generally lacked effect
  - Poor representation of in-theater logistics
  - Space assets not represented
- POTENTIAL RESULTS:
  - Conclusions based on incomplete and/or inaccurate information (due to emphasis on FLOT; battles with most assets in theater)
  - Major AF operational tasks and functions often taken for granted
    - Space programs
    - Airlift

OTHER MODELS BEING EVALUATED BY ASPVG

- Aggregate Level Simulation Protocol (ALSP) - W
  - Air Warfare Simulation (AWSIM)
  - Corps Battle Simulation (CBS)
  - MAGTF Tactical Warfare Simulation (MTWS) (future)
  - Research Evaluation and Systems Analysis Facility (RESA)
  - Combat Service Support Training Simulation System (CSSTSS)
  - Joint Electronic Combat - Electronic Warfare Simulation (JECEWSI) (future)
  - Tactical Simulation Model (TACSIM) (future)
- Joint Theater Level Simulation (JTLS) - W
- Combat IV
- Joint Conflict Model (JCM) - W
- Joint Integrated Campaign Model (JICM) - W

W: used in wargames

NEAR TERM ASPVG DIRECTION

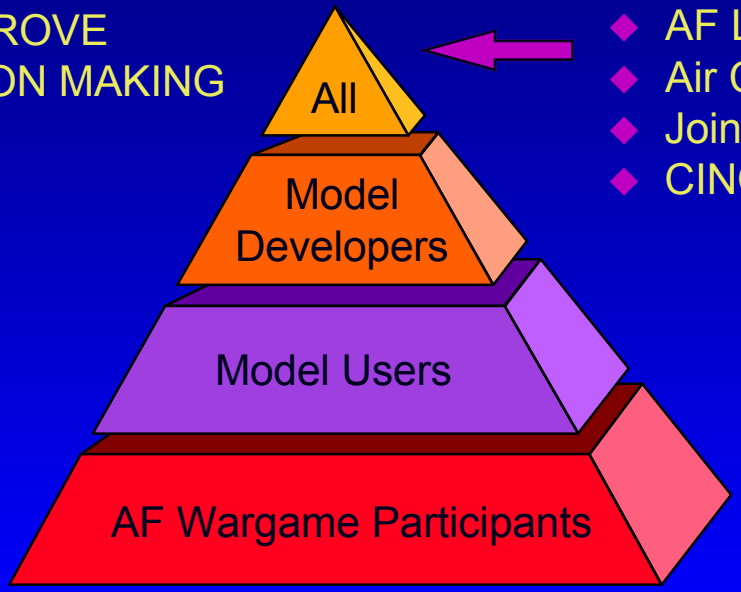
- Continue evaluating models
- Disseminate findings:

TO IMPROVE DECISION MAKING

TO CHANGE MODELS

TO IMPROVE UNDERSTANDING

TO EDUCATE (PRIME WARRIOR)



INCLUDING:
- AF Leadership
- Air Component Commanders
- Joint Staff
- CINC Staffs

LONG TERM AF DIRECTION

- Improve and increase AF participation in joint activities involving M&S:
  - Model development -- active assistance in developing air and space power representations
  - Wargaming and exercises -- active involvement from initial planning through scenario execution
- Support efforts to ensure correct representation of air and space power in joint M&S programs: JWARS, JSIMS, JMASS